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your ref PCT/GB 03/00052

our ref AMS.P51884WO

date 9 July 2003

Airmail & facsimile

Dear Sirs,

**PCT Application No. PCT/GB 03/00052**  
**WesternGeco Seismic Holdings Limited et al**

In response to the invitation dated 11 June 2003 we hereby request a further search on claims 8, 9 and 16-20.

The further search fee is being paid separately.

Yours faithfully  
Marks & Clerk

Dr. A.M. Suckling

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date 2 April 2004

09 JUL 2004

Facsimile

Dear Sirs

**PCT Application PCT/GB 03/00052**  
**WesternGeco Seismic Holdings Limited et al**

In response to the written opinion dated 4 March 2004 the acknowledgement that claims 8, 9, 16 and 18 are novel and inventive is appreciated. It is, however, submitted that claims 1 to 7, 10 to 15 and 17 are inventive over the documents cited.

Contrary to the suggestion in the written opinion, a copy of D2 was **not** annexed to the written opinion. I accordingly request that a copy of D2 is sent to me as soon as possible. It is noted, however, that D2 appears to be nothing more than a general overview of critically refracted events in seismic data, and there is no suggestion in the written opinion that D2 specifically relates to wavefield decomposition.

The method of claim 1 addresses two problems with the method of D1. The first problem is that the method of D1 is not easily capable of automation, since the automatic picking of primary reflection events is difficult. The second problem is that the method of D1 can be unreliable if other events occur at the same time as primary reflection events, since in this case the technique of minimising the down-going energy in the selected time window will not give accurate results. This problem is particularly serious at large source-receiver offsets.

Neither of these problems is identified in D1 or D2. It is therefore believed that an inventive step exists, firstly, in the identification of these problems. It is well-established that an inventive step can occur in the identification of a problem even if the solution to that problem

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is obvious once the problem has been identified (although it is submitted that in this case the solution is not obvious).

It is further submitted that a skilled person would have had no motivation to have combined D1 and D2 in the manner suggested in written opinion. D1 is clearly directed to the use of a window in which the seismic data contain primary reflections. Page 271 of D1 clearly states that "the extra condition is imposed that there should be no primary reflections present in the decomposed wavefield above the bottom ( $P^+$ )" (lines 1 and 2). D1 further states that a time window "that contains mainly primary reflections" should be chosen. There is no reference in D1 anywhere to the use of a time window containing primarily critical-refraction events.

Since D1 is directed to use only of primary refraction events, it is submitted that there would have been no motivation to have modified the method of D1 on the basis of general teaching in D2 relating to critical-refraction events. Such a modification would have been contrary to the specific teaching in D1 to use a time window containing primary reflection events.

It is further pointed out that the written opinion does not identify any a priori reasons why a skilled man would have considered modifying the method of D1 to use a time window containing critical-refraction events. The fact that critical-refraction events become the first arrivals at a receiver when the source-receiver offset is greater than the cross-over distance would not by itself have been sufficient reason for a skilled person to have modified the method of D1. The fact that critical-refraction events become the first arrivals when the source-receiver offset is greater than the cross-over distance can only suggest that claim 1 is obvious if the skilled person had had some motivation to use a time window that included the first arrivals at the receiver – however, it has nowhere been demonstrated that a skilled person would have had this motivation. D1 does not teach selecting a time window that includes the first arrivals at the receiver and, on the contrary, specifically teaches use of a time window that does not include the first arrivals at the receiver.

Similar comments apply in support of claim 10. The clear teaching in D1 to use a time window that contains mainly the primary reflection event does not give any motivation to a skilled person to use a time window containing the first arrival. Similarly, nothing in D2 gives any reason for a skilled person to have used a time window containing the first arrival and, furthermore, using a time window containing the first arrival would have been quite inconsistent with the teaching of D1.

In response to section V.1 of the written opinion it is pointed out that claims 1 and 10 cannot be written as a single dependent claim and dependent claims without significantly limiting the scope of protection. Claim 1 specifies that the time window contains only events arising from critical refraction of seismic energy, whereas claim 10 refers to selecting a portion of the seismic data in which the first arrival contains only upwardly propagating seismic energy. These two concepts cannot be contained in a single independent claim.

It is also pointed out that claim 13 is not directed to a method of processing seismic data, but is directed to a method of seismic surveying that includes a data processing step according to any of claims 1 to 12. Claim 13 therefore cannot be written as a dependent claim, and it already does refer to previous claims to the fullest extent that this is possible.

If there should be any outstanding objections to the patentability of claims 1 to 7, 10 to 15 and 17, and in view of the failure to supply of copy of D2 to the applicant, I request that a further written opinion is issued.

Yours faithfully  
Marks & Clerk

**Dr A. M. Suckling**